THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: KATSIR, D. et al.
Serial No. : 09/893,914
Filed : June 28, 2001
For : METHOD FOR PRODUCING HIGH SURFACE AREA FOIL ELECTRODES
Art Unit : 1775
Examiner : STEIN, STEPHEN J.

New York, NY 10036
December 15, 2003

MS Appeal Brief Patents
Commissioner for Patents
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APPEAL BRIEF

The present document is an Appeal Brief, in an appeal from the Final Office Action dated April 10, 2003. Following Applicants' request for reconsideration, an Advisory Action issued dated October 28, 2003, which stated that Applicants' arguments did not overcome the prior art rejections.

APPEAL BRIEF: TABLE OF CONTENTS

(1) REAL PARTY IN INTEREST
Acktar Ltd.

(2) RELATED APPEALS AND INTERFERENCES

None.

(3) STATUS OF CLAIMS

The present application is a continuation of U.S.S.N. 09/334,664 (now US Patent No. 6,287,673,) and as filed on March 3, 1998, contained claims 1-44. Original claims 38-44 and an additional claim 48 were the subject of the aforementioned US Patent. The present application was filed together with a preliminary amendment canceling claims 1-28. The remaining claims 29-37 have been amended, and were the subject of final rejection.

(4) STATUS OF AMENDMENTS

There are no unentered Amendments

(5) SUMMARY OF INVENTION

(i) Introduction

The present claims relate generally to products including a vacuum deposited surface layer which comprises valve metal oxide, and which find application for high surface area electrodes as components of capacitors.

(ii) Summary of Invention of claims 29-33

(a) Independent claim 29 relates to an article of manufacture having a vacuum deposited fractal surficial structure (such as is illustrated in photomicrographs, Figures 1A and 1B), which includes both valve metal and an oxide thereof (see page 4, lines 12-13 and page 5, lines 6-15), the valve metal being selected from aluminum, titanium, tantalum, niobium, zirconium, silicon, thorium, cadmium and tungsten (see page 1, lines 27-29).

(b) The following optional features of the article of claim 29 are claimed in dependent claims 30-33:

(i) the surficial structure is self-similar between a length scale of between about 2 microns and 0.2 microns (claim 30 and page 9, lines 1-6);

(ii) the valve metal is aluminum (claim 31 and Example 1, page 8, line 21, et seq.);
(iii) the article is comprised in a capacitor (claim 32 and e.g. page 5, lines 1-5 and page 6, line 6); and
(iv) the article is comprised in an anodized electrode (claim 33 and e.g. page 3, lines 3-6, page 5, lines 1-5 and page 6, line 6).
(c) Explanatory notes.

(i) Where reference is made in the specification to vacuum deposition in presence of oxygen, mention of deposited ``valve metal'' (and of specified deposited valve metals) is to be understood as including the metal oxide, see e.g. page 5, lines 6-16, and Example 1 entitled ``Deposition of Fractal-Like Aluminum Surfaces'' (page 8, line 21, et seq) with especial reference to the statement regarding the product: ``It follows from stoichiometry that 30.3% of the aluminum was in the form of Al_2O_3 and 69.7% was in the form of aluminum metal'' (page 9, lines 18-19).

(ii) Original claim 29 referred to ``a fractal-like surficial structure''. Following official objection, ``fractal-like'' was replaced by --fractal-- in claim 29. It may be seen from the following quotation (emphasis added) that the term fractal, particularly as the term is used in the present technology, is an approximation, and this justified replacing ``fractal-like'' by -fractal-- in claim 29, and understanding ``fractal-like'' in this approximate sense, throughout the specification:

``In fractal geometry, a number of an element is found repeated, but reduced, on larger elements having <u>nearly</u> the same shape. This assignment of shape can - <u>at least approximately</u> - be achieved with methods of thin-layer technology by setting the method parameters.'' (U.S. Patent No. 5,571,158 to Bolz et al., col. 4, lines 51-56.)

(3) Summary of Invention of claims 34-37

(a) Independent claim 34 relates to an electrode comprising a discontinuous vacuum deposited layer of an oxide of a first valve metal, on a surface of an electrically conductive substrate such as a valve metal foil (see page 4, lines 20-22, page 6, lines 11-15 and Example 2 commencing on Page 13, line 1).

(b) A discontinuous layer in claim 34 means regions of deposit 18 separated by gaps 20, the deposition being on foil substrate 10 (Figure 3C and page 11, lines13-15). The discontinuous nature of the deposit may be demonstrated by the fact that foils having such a deposit have negligible resistance to the transverse flow of electricity, whereas a similar foil having a continuous deposit has negligible transverse conductance (page 13, lines 10-16).

(c) The following optional features of the electrode of claim 34 are claimed in dependent claims 35-37:

(i) the electrically conductive substrate includes a second valve metal (claim 35; this means that a second valve metal as oxide is deposited over the discontinuous vacuum deposited layer of an oxide of a first valve metal, see page 7, lines 7-9 and page 13, lines 20-23, as well as explanatory note 2 (c) (i), above); and

(ii) the first and second valve metals are identical (claim 36) - this means that the valve metal of the first discontinuous layer of oxide and the valve metal of the second layer of oxide are the same, e.g. aluminum (claim 37). It is believed to be self-evident that the valve metals (deposited as oxides) in each layer may be selected from the list on page 1, lines 27-29 and that they may therefore be the same or different.

(6) ISSUES

(a) Whether, under 35 U.S.C. § 102(b), claims 34-37 are anticipated by U.S. Patent No. 5,822,177 (Popp et al.).

(b) Whether, under 35 U.S.C. § 103(a), claims 29-33 are unpatentable over Popp et al. in view of U.S. Patent No. 5,431,971 (Allegret et al.).

(7) GROUPING OF CLAIMS

It is believed that the patentability of claims 34-37 should be determined on the basis of whether claim 34 is anticipated under 35 U.S.C. § 102(b), and that the patentability of claims 29-33 should be determined on the basis of whether claim 29 is unpatentable under 35 U.S.C. § 103(a).

(8) ARGUMENT

(A) CLAIM REJECTIONS - 35 U.S.C. § 102(b)

(1) Statement of rejection in Office Action

In paragraph 3 of the Office Action, claims 34-37 were rejected under this heading, as being anticipated by U.S. Patent No. 5,822,177 (Popp et al.).

(2) The invention of claim 34

Claim 34 is an independent claim, from which claims 35-37 depend (directly or indirectly). Claim 34 claims an electrode comprising: (a) an electrically conductive substrate; and (b) a discontinuous vacuum deposited layer of an oxide of a first valve metal, on a surface of said substrate.

(3) Explanation of ``discontinuous vacuum deposited layer''

In the context of the present invention, the discontinuous vacuum deposited valve metal oxide layer of claim 34, part (b), is such a layer which

(i) contains regions of deposit separated by gaps (see page 11 of the specification, at lines 13-15), and

(ii) is characterized - unlike a similar continuous layer - by transverse electrical conductance of a foil on which it is deposited (see page 13 of the specification, at lines 10-16).

(4) Reasons for rejection under 35 U.S.C. § 102(b)

In the Office Action, claims 34-37 were rejected as being anticipated by `177 (Popp et al.) for the following reasons:

(a) ``Popp teaches an electrolytic capacitor comprising an electrode of aluminum metal anode foil (electrically conductive valve metal substrate) and a dielectric layer of aluminum oxide (valve metal oxide) formed on the aluminum anode foil (col. 1,

lines 15-25). Popp further teaches that the electrode has a fractal surface coating (a discontinuous coating) (col. 2, lines 38-57).''

(b) ``With regard to the process limitations recited in claims 34-37, regarding the oxide layer being vacuum deposited, process limitations in product claims are generally not dispositive on patentability unless it is shown that the process limitations produce a materially different product. MPEP §2113''

(5) Effect of Process limitation in the product claims 34-37

(i) It is submitted, however, that claims 34-37 are novel over the cited reference without the necessity to rely on process limitations, and thus the Examiner's reasons for rejection in (b), above, are moot.

(ii) In this connection, it is noted nevertheless that the cited Popp refers to a process step of ``forming'' in product claim 1 and that cited Allegret refers to a process step of ``vaporization-condensation'' in product claim 1. In other words, it appears to be not uncommon in this art to include process steps in product claims.

(6) Claims 1 and 2 of U.S. Patent No. 5,822,177 (Popp et al.)

These claims read as follows:

``1. An electrolytic capacitor, comprising:

a metal anode;

a non-conducting insulating layer applied to the metal anode by forming the metal anode for producing a dielectric of the electrolyte capacitor;

an electrolyte in liquid, pasty or solid form constituting a cathode of the electrolytic capacitor; and

a flat cathode contact for supplying current to the electrolyte, wherein

the flat cathode contact is provided with an electrically conducting, fractal surface coating.

2. The electrolytic capacitor in accordance with claim 1, wherein the fractal surface coating is a material selected from the group consisting of iridium, tantalum and aluminum.''

(7) The capacitor claimed in the cited Popp et al. patent comprises a combination of separate entities.

These separate entities are:

(i) a metal anode;

(ii) a non-conducting insulating layer applied to the metal anode;

(iii) an electrolyte constituting a cathode; and

(iv) a flat cathode contact for supplying current to the electrolyte, which is provided with an electrically conducting, fractal surface coating.

(8) Statement in the Office Action regarding Popp et al.

(i) We submit that in the interest of greater accuracy, the statement in the Office Action, in rejecting claims 34-37 (see the passage labeled (4) (a), above), should read as follows, with our corrections indicated by underlining and square brackets:

``Popp teaches an electrolytic capacitor comprising an anode [electrode] of aluminum metal anode foil (electrically conductive valve metal substrate) and a dielectric layer of aluminum oxide (valve metal oxide) formed on the aluminum anode foil (col. 1, lines 15-25)''.

(ii) This corrected reason for rejection corresponds with what is claimed in present claim 34 - if the mode of deposition is ignored - with the vital difference, however, that in the present case (see page 11, lines 13-15 of the specification), the valve metal oxide layer is discontinuous in the sense that there are regions of deposit separated by gaps, whereas in the reference, since the deposited aluminum oxide layer must be by definition a ``non-conducting insulating layer'', it must be assumed to be a continuous layer, for insulation purposes. Indeed, this difference (discontinuity/continuity) between the structure of the electrode of claim 34 and the anode + insulating layer of the reference, has the effect that, as pointed out above, a foil on which the discontinuous valve metal oxide layer of the present electrode possesses transverse electrical conductance, whereas the corresponding layer of the reference is by definition insulating.

Thus, so far, it is clear that the corresponding construct of the reference does not anticipate the electrode of present claim 34.

(9) Further Statement in the Office Action regarding Popp et al.

(i) In the Office Action, the Examiner has added the following sentence, also in the passage labeled (4) (a), above:
``Popp further teaches that the electrode has a fractal surface coating (a discontinuous coating) (col. 2, lines 38-57).''

(ii) However, this statement is erroneous in two respects, as follows.

Firstly, it is not ``the electrode'' (i.e. the anode) of the reference which has a fractal surface, but rather the flat cathode contact, which is quite a separate entity from the anode.

Secondly, the expression in the Office Action ``a fractal surface coating (a discontinuous coating)'' together with a column and line reference, suggests to the reader that either the word ``discontinuous'' appears in the reference (which it does not), or that the fractal surface of the reference is necessarily discontinuous in the sense of the present invention (regions of deposit separated by gaps), which it is not.

(iii) Moreover, the electrically conducting fractal surface coating on the flat cathode contact of the reference, is in practice selected from the metals iridium, tantalum and aluminum, so that even if the fractal coating could be construed as discontinuous in the present sense (for which there is no evidence), the reference still would not anticipate present claim 34, which requires a layer of valve metal oxide on the substrate surface and not a conductive metal such as iridium, tantalum or aluminum.

(10) Conclusion

For the above reasons, it is submitted that the cited reference do not anticipate the subject-matter of claims 34-37.

(B) CLAIM REJECTIONS - 35 U.S.C. § 103

(1) Statement of Rejection in the Office Action

In paragraph 4 of the Office Action, claims 29-33 were rejected under this heading, as being unpatentable over Popp et al. in view of U.S. Patent No. 5,431,971 (Allegret et al.).

(2) The Invention of Claim 29

Claim 29 is an independent claim (from which claims 30-33 depend, directly or indirectly), and it reads as follows: ``An article of manufacture having a vacuum deposited fractal surficial structure, which fractal surficial structure includes both valve metal and an oxide thereof, the valve metal being selected from the group consisting of aluminum, titanium, tantalum, niobium, zirconium, silicon, thorium, cadmium and tungsten.''

(3) Discussion of cited Popp et al

It is clear from the above discussion (in relation to the 35 U.S.C. § 102 issue) of cited Popp et al. that the only fractal surface disclosed in this reference is that provided on the cathode contact, and that this fractal surface must be electrically conductive, such as surfaces constituted by the metals iridium tantalum or aluminum. By contrast, the insulating layer of this reference, which is, applied to the metal anode, is not fractal. Exemplary materials for this insulating layer are oxides of aluminum and tantalum.

(4) Discussion of cited Allegret et al.

(i) Stated briefly, the cited Allegret et al. patent claims in claim 1, a stabilized plate for an electrode of an electrolytic condenser, in the form of an electrically conducting substrate coated by vaporization-condensation on one or both faces with a 100-10000 nm thick deposit containing aluminum, and containing more than 50% by weight of the total deposited aluminium in the form of oxide, the deposit being constituted by grain agglomerates forming a porous matrix of aluminium oxide containing metallic aluminium crystallites embedded randomly inside the grains.

(ii) The surface of the product is said to have an increased effective surface area and thus endows the plate with a high output (see col. 1, lines 14-18 and col. 3, lines 11-15).
(iii) It is believed that the photomicrographs (Figs. 2-5) show absence of any fractal structure in the aluminum-containing deposit. Indeed, the word ``fractal'' does not appear in this reference.

(5) Statement in the Office Action as to obviousness
In the Office Action, it was stated that it would have been obvious to apply an electrode coating of aluminum/aluminum oxide as taught by Allegret et al. for the fractal coating in Popp et al., because it would provide good adherence to the metal substrate and good stability over time.

(6) Motivation to combine the cited references
In response to the obviousness rejection, it is pointed out that there are good reasons why a person of the art would not be motivated to substitute the Allegret et al. coating for the fractal metal surface of Popp et al.
(a) It is implicit in the Office Action that in the Examiner's view, the product of Popp et al. suffers from problems of adherence and stability over time (otherwise there is no reason why a person of the art should substitute the coating of Allegret et al.for the fractal coating of Popp), but there is no evidence to support such an implication.
(b) In this connection, attention is invited to the passage in Popp et al. (col. 7, lines 17-26), which reads as follows:

``The combination of a fractal iridium coating with the passivating substrate material titanium or tantalum for the cathode contact of the capacitor assures the stability over time of the cathode contact even in strongly acidic operating electrolytes, such as diluted sulfuric acid. Iridium has, as many platinum metals, a low hydrogen overvoltage. A titanium foil coated with iridium therefore does not reach the potential range of active titanium dissolution, even with an overload of the cathode contacts and beginning hydrogen generation.''

(c) It is believed that a person of the art would conclude from this passage in particular, that the inventors of Popp et al. have found their own solution to the problem of stability over time (including adherence) of the fractal coating, because the cathode contact with the platinum metal, non-valve metal iridium fractal coating of Popp et al. would be expected to have a stability, over time, which is far superior to that of Allegret et al's aluminum/ alumina composition, particularly in the presence of acidic electrolytes which would be expected to attack Allegret's composition much more easily.

(d) The fractal surface in Popp et al. must be electrically conductive, which in practice suggests a metal surface, whereas the high proportion of oxide in the Allegret et al. composition would substantially reduce the desired conductivity, and moreover, there is no suggestion in Popp et al. that a metal/metal oxide mixture could be suitable for the required purpose.

(e) It is submitted that the points mentioned in paragraphs (c) and (d), above, and in particular the nature and requirements of Popp et al.'s invention, show that a person of ordinary skill in the art would have little or no motivation to make the combination of Allegret et al. with Popp et al., as suggested in the Office Action. Nor is there any evidence that the prior art as a whole suggests the desirability of making this combination of references. Thus, Applicants believe that it would not be at all obvious to a person of ordinary skill in the art, to combine the two references in the manner suggested.

(7) Dates of the cited references

It is believed that a consideration of the dates of the cited references, and more particularly their application and priority dates, may also be relevant to the issue of obviousness.

(a) Popp et al. issued October 13, 1998, based on a filing date July 11, 1996 and a German priority date July 11, 1995.

(b) Allegret et al. issued July 11, 1995, based on a filing date February 12, 1993 and a French priority date February 14, 1992. The French priority application (92 01899) was published

September 3, 1993 (see Exhibit A, which has been printed from the European Patent Office database).

(c) As persons skilled in the art, the inventors of Popp et al. could have included in their invention some details of Allegret et al., the French version of which was published some 22 months before Popp et al. filed their application in Germany, and 34 months before their U.S. application was filed. The fact that they did not do so suggests that combining the subject-matter of the two references would not have been obvious to a person of the art.

(8) Effect of making the combination of references

(a) Even if such a combination of references should be made, the result would be substitution of the non-fractal aluminum/aluminum oxide layer as taught by Allegret et al. for the fractal coating in Popp et al., resulting in a construct devoid of fractal structure, whereas fractal structure is essential in present claim 29.

(b) Moreover, annealing is also more effective on the present fractal surfaces compared with the prior art generally and Allegret et al. in particular (see present specification at page 10, lines 17-22). Otherwise stated, this advantage of the present invention could not have been predicted from a combination of Allegret et al. with Popp et al., the latter being completely silent on the subject of annealing a fractal surface - apart from its other differences from the present invention, and in particular the facts that its fractal layer is exclusively metallic and that its insulating valve metal oxide is non-fractal.

(c) Applicants submit that any possible imputation in the Office Action, to the effect that it would be obvious to substitute the Allegret composition and simultaneously to ensure that it has a fractal structure, would be invalid for the following reasons:

(i) Allegret et al's. disclosure is not concerned with fractal structures.

(ii) Popp et al's. disclosure deals only with deposition of a fractal electrically conductive metal structure, which may

consist of the non-valve metal iridium, in preference to the valve metals aluminum and tantalum.

(iii) Popp does not suggest the use of any oxide, either in place of or in admixture with the conductive fractal metal.

(9) Non-obviousness of Applicants' Invention

It is the present inventors who have invented the article of claim 29, having a surface structure which combines the two elements of fractal surficial structure and a composition including both valve metal and valve metal oxide. As has been stated in many legal decisions, the Examiner is not entitled to assume that Applicants' invention is part of the prior art, as would be the case if he made an assumption that any person could ``easily'' make a coating similar to that of Allegret et al., but in fractal form. Obviousness cannot be established by a hindsight combination of references to produce the claimed invention. It is the prior art itself, and not the Applicants' achievement, that must establish the obviousness of the combination. (In re Gorman, 933 F.2d 982, 986, 18 USPQ2d 1885, 1888 (Fed.Cir.1991).

(10) Conclusion

It is submitted that the above arguments show that claims 29-33 are not rendered unpatentable under 35 U.S.C. § 103, by Popp et al. in view of Allegret et al.

Respectfully submitted,

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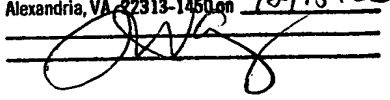

(9) APPENDIX

The claims which are the subject of the present Appeal are as follows:

29. An article of manufacture having a vacuum deposited fractal surficial structure, which fractal surficial structure includes both valve metal and an oxide thereof, the valve metal being selected from the group consisting of aluminum, titanium, tantalum, niobium, zirconium, silicon, thorium, cadmium and tungsten.

30. The article of manufacture of claim 29, wherein said surficial structure is self-similar between a length scale of between about 2 microns and 0.2 microns.

31. The article of manufacture of claim 29, wherein said valve metal is aluminum.

32. A capacitor comprising the article of manufacture of claim 29.

33. An anodized electrode comprising the article of manufacture of claim 29.

34. An electrode comprising:

(a) an electrically conductive substrate; and

(b) a discontinuous vacuum deposited layer of an oxide of a first valve metal, on a surface of said substrate.

35. The electrode of claim 34, wherein said electrically conductive substrate includes a second valve metal.

36. The electrode of claim 35, wherein said first and second valve metals are identical.

37. The electrode of claim 36, wherein said valve metal is aluminum.

EXHIBIT A - Bibliographic data for FR2688092

Abstract not available for FR2688092
Abstract of correspondent: **US5431971**

The invention relates to a plate which is intended to produce either an anode or a cathode of an electrolytic condenser. The plate is in the form of an electricity conducting substrate coated with an aluminium based deposit constituted of grain agglomerates where more than 50% by weight of the total deposited aluminium is in oxide state and forms a porous matrix of aluminium oxide containing metallic aluminium crystallites. The invention enables plates to be obtained which have an increased output, and the invention thus enables the condensers which will be associated with them to be of reduced size.

Plate including a coating of aluminium, within aluminium oxyde agglomerates for an electrode of an electrolytic condenser

Patent number:	FR2688092
Publication date:	1993-09-03
Inventor:	EMMANUEL GARIEL; FRANCIS ALLEGRET; MOHAMED BENMALEK
Applicant:	TRAITEMENT METAUX ALLIAGES SA (FR)
Classification:	
- international:	C23C14/06; C23C14/08; C23C14/24; H01G9/04
- european:	C23C14/00F, C23C14/06N, H01G9/04C
Application number:	FR19920001899 19920214
Priority number(s):	FR19920001899 19920214

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